Articles

Injuries to Occupants in Cargo Areas of Pickup Trucks

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Transporting passengers in the cargo area of pickup trucks is a public health safety issue in the United States. Our study compared crashes involving passengers in the cargo area with those involving passengers in the cab. We obtained data for all injury events of pickup occupants for 1990 from the California Highway Patrol. A total of 702 traffic reports coded as having passengers riding in pickup truck beds involved 1,685 passengers in the cargo area and 865 in the cab. Significantly more events involving passengers in the cargo area occurred in summer in rural areas and were noncollisions than did events with only cab passengers. Crashes with passengers in the cargo area resulted in death in 5% of passengers. Of the drivers, 81% were male and 22% were younger than 20 years. Among the 1,685 passengers in the cargo area, 65% were male, 36% were younger than 15 years, and 30% were ages 15 to 19 years. Passengers in the cargo area were more frequently ejected and more seriously injured than their counterparts in the cab. Legislation to restrict travel in truck beds and the design of restraints for this area are some measures that may reduce the risk of injury.

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Over the past 20 years, the pickup truck has become an increasingly popular vehicle. The number of light trucks registered increased from about 20 million in 1975 to almost 39 million in 1991. Concomitant with this increase in the number of pickup trucks on the roadways was an increase in pickup truck-related fatalities. The number of deaths of occupants of light trucks has increased 72.6% between 1975 and 1991. In 1975, 13.5% of all occupant deaths occurred in light trucks compared with 24.1% in 1991. The fatality rate for occupants of light trucks was 21.53 per 100,000 registered light trucks compared with 15.63 per 100,000 passenger car occupants in 1991.[1]

These statistics confirm that travel in pickup trucks must be addressed as an occupant safety issue. Of particular concern is travel in the cargo area of a pickup truck. The cargo area is a nonpassenger location of the vehicle, and, as such, it is not designed or required to meet safety standards applicable to passenger locations. Seat-belt laws and child passenger safety laws regulating travel in passenger vehicles are not applicable to the cargo area of pickup trucks. In 1991 in the United States, 238 deaths occurred among occupants of the cargo area of pickup trucks.[1] Children aged 0 through 18 years accounted for 50% of the deaths.

An analysis of crash data related to the occupants of pickup trucks, their location in the vehicle, and injury outcomes will provide data needed to more adequately assess the issue of risk to occupants in pickup trucks. Our study compares crashes in which passengers were riding in the cab with crashes in which passengers were riding in the cargo area of a pickup truck and describes the circumstances, drivers, and passengers of those events with cargo area passengers.

Methods

Data

Data for this study were obtained from the 1990 Statewide Integrated Traffic Records System maintained by the California Highway Patrol, Sacramento, California. The Traffic Records System collects and abstracts data from police crash reports for all injury and fatal crashes occurring on public roadways and investigated by any law enforcement agency within the State of California.

The state database lists vans and pickup trucks together as one classification. Pickup trucks were selected from the data by license plate numbers, which reflect the type of vehicle registration. Pickup trucks are registered as commercial vehicles whereas vans are primarily registered as passenger vehicles. The exceptions to these assignments are pickup trucks with a camper shell permanently attached, which are registered as passenger vehicles, and vans without seats behind the driver's seat, which are registered as commercial vehicles.

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For our study, commercially registered vehicles from the van or truck category were selected as a proxy for pickup trucks. Those pickups assigned a passenger-vehicle license plate number were not included in the analysis as these vehicles could not be selected out from all other passenger vehicles. To test the validity of this proxy method, vans or pickup trucks in the database involved in fatal crashes were linked to the pickup trucks in the Fatal Accident Reporting System for the same year, 1990. This system identifies pickup trucks and vans separately. All vehicles were linked by the exact county, date, and time of crash. Model year and driver's age were used to identify the correct vehicle in fatal crashes that involved more than one pickup truck or van. Exact time was used because both systems obtain their data from police crash reports, which list the time. Of the pickup trucks and vans with commercial license plate numbers, 84% were linked to pickup trucks in the Fatal Accident Reporting System. Of these pickup truck records, 85% were matched to the Statewide Integrated Traffic Records System records with a commercial license plate number. Thus, the method selected for the Statewide Integrated Traffic Records System database was thought to be reasonable to obtain data on pickup trucks.

Definitions of age and cause of crash were those used by the California Highway Patrol. Only events involving injury to pickup truck occupants were selected for study. The primary collision factor was that most responsible for causing the collision, as determined by investigating officers.

For this study, seasons were grouped as follows: winter—December, January, and February; spring—March, April, and May; summer—June, July, and August; and fall—September, October, and November. Times of day were grouped into four 6-hour blocks beginning at midnight, 6 AM, 12 noon, and 6 PM. Urban areas included incorporated cities; rural areas included all unincorporated areas.

"Tow-away crash" was the variable used as an indicator of crash severity. "Ejection" included victims who were partially and those who were completely ejected from the vehicle. Collisions included crashes with objects, other vehicles, pedestrians, bicycles, or animals. "Noncollision events" were those events in which no impact occurred with objects, other vehicles, pedestrians, bicycles, or animals. They also included rollovers.

Statistical Methods

Injury crashes involving pickup trucks with passengers in the cargo area first were compared with injury crashes in which there were no passengers in the cargo area. Drivers carrying passengers in the cargo area were characterized and compared with drivers who had not carried passengers in the cargo area. For those vehicles that carried passengers in cargo areas, passengers in the cargo area were characterized and compared with passengers in the cab. Cross-tabulations were analyzed using the χ^2 test for independence.

Results

In 1990 there were 31,908 crashes involving injury or death to a pickup truck occupant. Of these, 31,206 had passengers only in the cab. Of the crashes, 702 were coded as having passengers riding in the cargo area of a pickup truck, involving 1,685 passengers in the cargo area and 865 passengers in the cab.

Comparison of Injuries

Time and location. Seasonal differences were apparent between the two groups ($P < .001$). Cargo area passenger crashes occurred more frequently in summer (34%) and less frequently in winter (15%). Cab-only passenger crashes were almost equally distributed by season (Table 1). Almost half (43%) of the cargo area passenger crashes occurred between noon and 6 PM. The time distribution was significantly different between the two groups, with more of the cargo passenger events occurring between midnight and 6 AM and fewer between 6 AM and noon (Table 1). Significantly more cargo passenger crashes occurred on the weekend (42%) versus cab-only passenger crashes (28%).

A striking difference was noted between the two groups with respect to location of the event: Almost half (43%) of the cargo area passenger crashes occurred in rural communities compared with a third for cab-only passenger crashes (Table 1).

Crash variables. Using tow-away as an indicator of crash severity, we found that 77% of the cab-only passenger crashes were tow-away crashes compared with

TABLE 1.—*Time and Place of Events Involving Injury to Pickup Truck Occupants*

Time and Place	Passengers in Cargo Area (n=702) No.	(%)	Passengers Only in Cab (n=31,206) No.	(%)	χ^2 P Value
Season					
Winter	107	(15)	7,558	(24)	< .001
Spring	158	(23)	8,171	(26)	
Summer	240	(34)	7,866	(25)	
Fall	197	(28)	7,611	(24)	
Time					
6 AM to noon	107	(15)	7,631	(24)	< .001
Noon to 6 PM	303	(43)	12,222	(39)	
6 PM to midnight	192	(27)	8,000	(26)	
Midnight to 6 AM	100	(14)	3,353	(11)	
Day of Week					
Monday	80	(11)	4,583	(15)	
Tuesday	68	(10)	4,167	(13)	
Wednesday	77	(11)	4,209	(14)	
Thursday	74	(11)	4,275	(14)	
Friday	108	(15)	5,197	(17)	
Saturday	150	(21)	4,782	(15)	
Sunday	145	(21)	3,993	(13)	
Community					
Urban	401	(57)	20,966	(67)	< .001
Rural	300	(43)	10,215	(33)	
Unknown	1	(0)	25	(0)	

TABLE 2.—*Crash Variables of Events Involving Injury to Pickup Truck Occupants**

Variable	Passengers in Cargo Area (n=702) No.	(%)	Passengers Only in Cab (n=31,206) No.	(%)	χ^2 P Value
Tow-away crash	471	(67)	24,123	(77)	< .001
Crash type					
Noncollision	120	(17)	1,862	(6)	< .001
Collision (other vehicle)	442	(63)	23,715	(76)	
Other	140	(20)	5,627	(18)	
Unknown	0	--	2	--	
Primary collision factor					
DUI†	129	(19)	6,118	(20)	.653
Unsafe speed	187	(28)	7,994	(27)	
Other	362	(53)	15,877	(53)	
Unknown	24	--	1,217	--	
Fatal crash	32	(4.6)	745	(2.4)	< .001

*The numbers given in the "unknown" categories were not included in the calculation of percentages

†Driving ability is impaired by ("under the influence of") alcohol or drugs.

64% for the cargo area passenger crashes ($P = .001$). Yet, significantly more of the crashes involving cargo area passengers were fatal crashes (4.6% versus 2.4%; Table 2). A significantly greater proportion of the cargo area passenger crashes were noncollision events (17%), compared with 6% for cab-only crashes (Table 2). The primary collision factor did not differ significantly between the two groups; unsafe speed was the most important factor for both groups.

Comparison of Drivers

More than 80% of drivers in both groups were male. Those who carried passengers in the cargo area and were involved in an injury collision were younger; 22% were younger than 20 years compared with 11% for crashes in which no passenger was in the cargo area ($P < .001$) (Table 3). The two groups did not differ with respect to alcohol use. According to the opinion of the officer writing the accident report, more than 75% of the drivers had not been drinking at the time of the crash.

Characteristics of Passengers and Injuries

A significantly greater proportion of passengers in the cargo area were male (65%) and younger than those riding in the cab: 29% were 5 to 14 years old, and 7% were younger than 4 years (Table 4).

The incidence of passenger ejection from the vehicle was significantly higher for those in the cargo area, 25%, versus 4% for those in the cab. Among those in the cargo area of the pickup truck, 64% were injured and 1.2% fatally injured compared with 51% injured and less than 0.5% fatally injured for those in the cab ($P < .001$) (Table 4).

Conclusions

Our study was designed to characterize pickup truck collisions, drivers, and passengers to determine if there were significant differences between events involving passengers in the cargo area and those in which all occupants were in the cab. Our results add to the evidence that travel in the cargo area of pickup trucks is a substantial risk factor for serious injury in a crash compared with travel in the cab. Even with fewer severe (tow-away) crashes and more noncollision events, passengers in the cargo area had a higher proportion of fatalities from crashes than those with only cab passengers. Cargo area passengers also sustained more injuries. The proportion of ejections for passengers in the cargo area was more than six times that for those in the cab. The increased risk of ejection from the cargo area compared with that in the cab has also been documented in other studies, using different databases.[2-6]

Travel in pickup trucks is a problem affecting youth, from the standpoint of both the passengers and the drivers. Of the cargo area passengers, 65% were younger than 20. Those children who were younger than 12 years, unless somehow "secured" or with an adult, would have been in violation of the existing California law regarding travel in the cargo areas of pickup trucks. Children younger than 4 years (7%) by law must travel in child-restraint systems and were in violation of the California Child Passenger Safety Law.[7]

In this sample of crash events, the drivers who carried passengers in the cargo area were younger than those who had no passengers in the cargo area. More than four fifths of all pickup truck drivers were male. In addition to the age and sex of the driver, the results showing that a significantly greater proportion of the

TABLE 3.—*Characteristics of Pickup Truck Drivers in Events Involving Injury to Pickup Truck Occupants**

Driver Characteristic	Passengers in Cargo Area (n=704)† No.	(%)	Passengers Only in Cab (n=32,439)† No.	(%)	χ^2 P Value
Sex of driver					
Male	570	(81)	26,625	(82)	.445
Female	132	(19)	5,723	(18)	
Unknown	2	--	91	--	
Age of driver, years					
1-14	0	--	27	(0)	< .001
15-19	156	(22)	3,527	(11)	
20-29	233	(33)	11,747	(36)	
≥ 30	315	(45)	17,138	(53)	
Alcohol					
Not been drinking	548	(81)	25,049	(81)	.114
Drinking not DUI‡	30	(4)	948	(3)	
DUI	89	(13)	4,482	(14)	
Drinking but impairment unknown	4	(2)	477	(2)	
Unknown	13	--	1,483	--	

DUI = driving under the influence

*The numbers given in the "unknown" categories were not included in the calculation of percentages.

†Numbers are greater than the number of crashes because some events involved >1 pick-up truck driver.

‡Driver had been drinking but not under the influence of alcohol.

TABLE 4.—*Characteristics of Passengers Involved in Injury Events With Cargo Area Occupants (n = 704 Pickup Trucks)**

Variable	Cargo Area Passengers (n = 1,685) No.	(%)	Cab Passengers (n = 865) No.	(%)	χ^2 P Value
Gender					
Male	1,090	(65)	429	(50)	< .001
Female	586	(35)	429	(50)	
Unknown	9	--	7	--	
Age, years					
0-4	117	(7)	81	(9)	< .001
5-14	497	(29)	96	(11)	
15-19	500	(30)	235	(28)	
20-29	306	(19)	217	(25)	
≥ 30	237	(14)	219	(26)	
Unknown	28	--	17	--	
Ejection					
Yes	419	(25)	38	(4)	< .001
No	1,266	(75)	827	(96)	
Outcome					
Death	21	(1.2)	4	(0.5)	< .001
Injury	1,071	(64)	442	(51)	
No injury	593	(35)	419	(48)	

*The numbers in the "unknown" categories were not included in the calculation of percentages.

crashes with passengers in the cargo area occurred during the summer and on weekends suggests further that it is an adolescent and male issue involving, perhaps, recreational use of the vehicle.

Our study is limited by the underreporting of noncollision events. Many of these, because they are single-vehicle events and involve no vehicle damage, are not reported to police agencies.[8,9] A second limitation is that the injury scale used in police data is a crude measure of injury severity. Therefore, we were only able to analyze the data by injury, the absence of injury, or death.[10] Patterns of injury and severity could not be determined. We did not have exposure data or information on the reasons why passengers were in the cargo area, the conditions under which they were there, and the purpose of the trip.

Discussion

The issue of occupant travel in the cargo area of pickup trucks must be more fully addressed for three reasons: over the past decade, sales of pickup trucks have greatly increased; the cargo area is not designed to carry passengers; and the safety of occupants in designated passenger areas has been improved by laws on using seat belts and restraints.

State laws addressing travel in the cargo area of pickup trucks vary considerably.[11] Only Minnesota, New Jersey, New Mexico, and California prohibit travel in the cargo area of unenclosed pickup trucks. A few states restrict travel in the open cargo area under certain conditions. In contrast, many states have regulations regarding securing animals in the cargo area of pickup trucks.

Studies that document the hazards of travel in the cargo area of pickup trucks can convince the public as well as legislative bodies and policymakers to impose restrictions on this type of travel. In keeping with the American Academy of Pediatrics policy statement, children through 18 years of age should be prohibited from traveling in this nonpassenger location.[12] Manufacturers and salespersons ought to warn consumers about the dangers of travel in the cargo area of pickup trucks and the increased risk of ejection and inform them that the cargo area is not designed for passengers and does not meet standards for passenger compartments of motor vehicles. There is no safe, crash-tested means of travel in the cargo areas of pickup trucks. Public policy measures aimed at eliminating travel in the cargo areas of pickup trucks, as well as design features to provide safe passenger compartments in pickup trucks, will reduce the health care costs and human tragedy related to travel in the cargo areas of pickup trucks.

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